

AstroPorter, Phase I

Completed Technology Project (2018 - 2019)



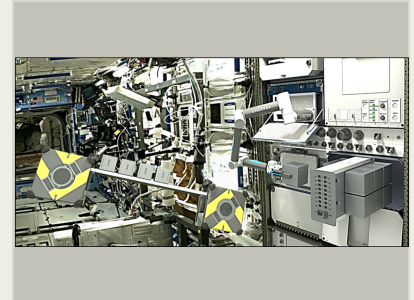
Project Introduction

Tethers Unlimited, Inc. (TUI) proposes to develop a collaborative robotics platform, AstroPorter, for multi-agent coordinated tasks on the International Space Station (ISS). TUI will develop an AstroPorter payload for Astrobees to perform collaborative robotics tasks with TUI's MANTIS - an EXPRESS Rack payload with a robotic arm for telerobotic operation of experiments on the ISS. AstroPorter will interface with Astrobees through the dedicated payload bay and function as a platform for transporting equipment and other stowed material around the ISS. Each AstroPorter will be equipped with TUI's high precision 3DOF end-effector placement gimbal, COBRA-Bee, and support the optional installation of platforms between two AstroPorters by crew. This platform will be used to place cumbersome equipment or stowed materials for transport. The high-degree of mobility provided by Astrobees places it in an excellent position to perform cataloging and fetching tasks within a collaborative robotic environment with MANTIS serving to support fixed-base manipulation tasks. Developing the payload and software infrastructure that allows Astrobees and MANTIS to share subtasks using collaborative control will extend the capability of robotic systems aboard the ISS, reduce astronaut burden for basic caretaking tasks, and bring self-maintenance of in-space habitats closer to reality. In the Phase 1 effort, the TRL of AstroPorter will be matured to TRL-5, in preparation for preliminary demonstrations on the ISS in Phase II.

Anticipated Benefits

AstroPorter is a crosscutting technology which directly addresses three of the NASA 2015 Technology Roadmap Areas: 4.2.7 Collaborative Mobility, 4.3.5 Collaborative Manipulation, and 4.5.4 Multi-Agent Coordination. The development of AstroPorter and collaborative robotic demonstrations of Astrobees and MANTIS for habitat caretaking on the ISS will benefit not only ISS, but future missions and initiatives like NASA's Deep Space Gateway.

TUI views the development of the proposed collaborative robotics technology and demonstrations as a milestone on our roadmap to implementing complex, distributed space systems and in-space assembly under the general In-Space Manufacturing initiative. This technology will be critical for the assembly of TUI's Constructable Platform - a modular self-assembling persistent structure, developed in partnership with DARPA to provide power and communication services for payload hosting.



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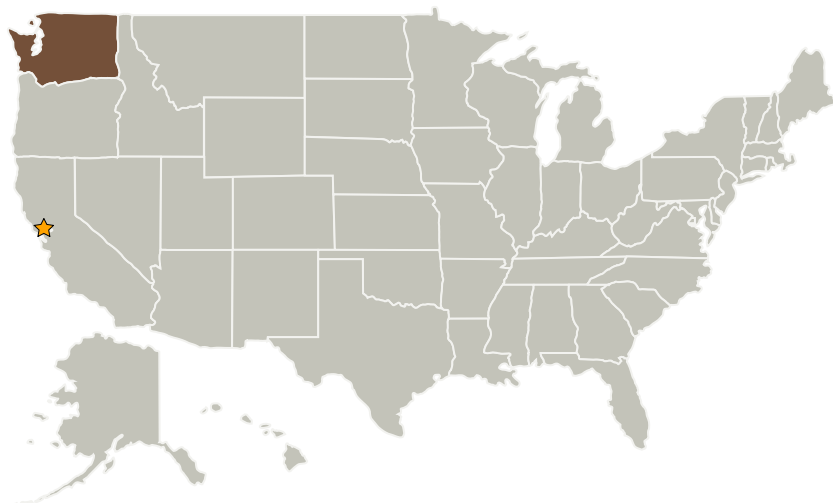
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Tethers Unlimited Inc	Supporting Organization	Industry	

Primary U.S. Work Locations

Washington

Project Transitions

July 2018: Project Start

 February 2019: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

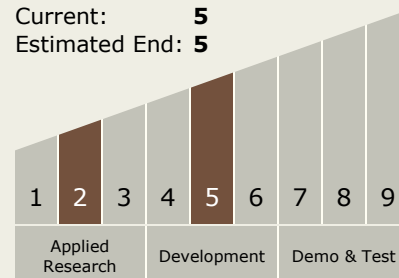
Carlos Torrez

Principal Investigator:

Nathan Britton

Technology Maturity (TRL)

Start: 2
 Current: 5
 Estimated End: 5



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Images



Project Image

(<https://techport.nasa.gov/image/34761>)

Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.2 Mobility
 - └ TX04.2.6 Collaborative Mobility